ARTHROPODS FROM A SAW-WHET OWL (*AEGOLIUS ACADICUS*) NEST IN CONNECTICUT[1]

James R. Philips[2], Michael Root[3], Peter DeSimone[3]

ABSTRACT: Analysis of saw-whet owl (*Aegolius acadicus*) nest material collected in Sharon, CT yielded 6 species of insects and 14 species of mites, as well as phoretic nematodes. None of the species had previously been found in saw-whet owl nests and the list includes 3 new mite records for the State of Connecticut.

Saw-whet owls (*Aegolius acadicus*) (Gmelin)) are the smallest owls in eastern North American and occur in western, central and northeastern United States, as well as Canada and Mexico. They feed largely on rodents and nest in tree-holes, but they have not been studied as extensively as other eastern owls, and there are no published records of parasites or other arthropods found in saw-whet owl nests.

Owl nests provide a prime habitat for many kinds of arthropods. The owls themselves represent only one potential food source; there is also a wide variety of organic material, including carrion in the form of prey remains, undigested pellets regurgitated by the owls, and plant material in the nest. Thus the nests attract a wide variety of saprophagous, predatory and parasitic arthropods which may be present in great numbers (Philips and Dindal 1977, 1979b). Owl nests may also contain unique taxa - for example, the beetle *Trox tytus* Robinson is known only from barn owl (*Tyto alba* (Scop.)) nests (Vaurie, 1955) and Fain and Philips (1977a, 1977b, 1978a, 1979) have described a number of new mite genera and species from a screech owl (*Otus asio* (L.)) nest. The objective of this study was to survey the arthropod fauna of a sample of saw-whet owl nest material.

Methods

During a survey of breeding birds of prey in northwestern Connecticut, a saw-whet owl nest was located by the junior authors in a tree-hole in a dead black cherry (*Prunus serotina* Ehrh.) in Sharon, CT. The hole was 8.2m high and a sample of nest material was collected on 13 June 1978 while the one chick in the nest was banded. The sample of nest material was highly odoriferous and contained decaying prey remains as well as pellets and plant matter. The sample was shipped to the senior author for analysis. However, upon arrival it was found that conditions had become anaerobic

[1]Received July 26, 1982

[2]Math/Science Division, Babson College, Babson Park (Wellesley), MA 02157

[3]West Cornwall Road, Sharon, CT 06069

and the sample had become a mass of semi-liquefied material. This prevented quantitative analysis, but the material was examined under a dissecting microscope before disposal.

Results

Although no invertebrates were still alive in the sample at the time of analysis, 204 arthropods were found intact. These represented 14 species of mites and 6 species of insects (Table I). In addition, hundreds of nematodes were found attached to 4 of the trogid beetles on the sides of the elytra and pronotum, and on the prosternum, metasternum, and first abdominal segment. Hundreds of unattached nematodes were also found underneath the elytra of one trogid beetle and one silphid beetle. The prey remains in the sample included skulls of woodland jumping mice (*Napaeozapus insignis* (Miller)) and red-backed voles, (*Clethrionomys gapperi* (Vigors)).

Discussion

The role beetles play as hosts for other invertebrates needing food or transportation was dramatically illustrated in this sample by the finding of the nematodes and 6 species of mites associated with the beetles. No nematodes have previously been found on trogid beetles. Both the subelytral and externally attached nematodes seemed to be phoretic rather than parasitic. The externally attached nematodes were dauerlarvae, the third larval instar which is the usual phoretic stage formed under adverse conditions. According to Croll and Matthews (1977), rhabditid nematodes such as *Pelodera* form these larvae and attach by a secretion to beetles like *Phodius*. Crowson (1981) stated that a considerable variety of nematodes have such phoretic associations with beetles. However the unusual circumstances of this record prevent the assumption that this is a frequent association between nematodes and trogids. On the contrary, examination of 3,433 additional specimens of trogid beetles in museums and in the field has not yielded another incidence of an external infestation of dauerlarvae. However, phoretic nematodes have been found on mites of the genus *Macrocheles*, which are phoretic on trogid beetles (Philips and Dindal 1979a). The *Macrocheles* found in this nest represent a new species (R.M. Emberson pers. comm.).

Both parasitic and phoretic mites were found on the trogid beetles. Subelytral forms included an undescribed genus of pyemotid mite, *Histiostoma* sp. B., *Eviphis* sp., and *Poecilochirus necrophori* Vitzth. No mites have previously been reported from underneath the elytra of trogid beetles. The undescribed pyemotid mites were found on only one trogid, on the

anteroventral side of the elytra attached to membranous tissue and underneath both wings attached to cuticle at the wing insertion. Other pyemotid mites parasitize many beetle families (Cross and Krantz, 1964, Cross et al. 1975) and it is likely that these are also parasites.

All specimens of *Histiostoma* sp.B. were found under the elytra of 4 trogid beetles. These anoetid mites were all in the hypopus stage, a form adapted for phoresy possessing a posteroventral sucker plate and lacking mouthparts. Anoetid hypopi are of widespread occurrence on insects; many species occur on trogid beetle exteriors (pers. obs.) and one species of *Pelzneria* has been found underneath the elytra of *Nicrophorus* (Springett, 1968). It is surprising that in this sample, *Histiostoma* sp.B. occurred only on *Trox* underneath the elytra, *Histiostoma* sp.A. occurred only on the exterior of *Nicrophorus,* and no mites occurred on *Carcinops.* Anoetid mite hypopi have been found on *Carcinops* in other birds' nests (pers. obs.).

Three trogid beetles harbored 4 *Eviphis* females under or over the wings, and 7 more *Eviphis* were found separately in the sample material. Eviphidids have not previously been found associated with trogid beetles, but the family generally disperses by phoresy. *Alliphis halleri* Can., for example, is transported by *Nicrophorus* (Springett 1968).

Four *Poecilochirus* duetonymphs were found under the elytra and on the exterior of 2 trogid beetles; the rest occurred similarly on 2 *Nicrophorus. Poecilochirus necrophori* Vitz. deutonymphs are typically phoretic on *Nicrophorus,* and this relationship has been studied by Springett (1968). The mites feed on small fly larvae, fly eggs, and carrion encountered by their beetle host, whose larvae feed on carrion.

While some mites colonize owl nests with the assistance of flying insects, other reach the nests on various prey species. Three mammal associates were found in the sample. *Dermacarus newyorkensis* Fain and *Glycyphagus hypudaei* (Koch) hypopi have posteroventral claspers adapted for gripping hair; these species have not previously been found in Connecticut. Both species utilize many rodent hosts, but *D. newyorkensis* is known from woodland jumping mice, while *G. hypudaei* is known from the red-backed vole (Whitaker and Wilson 1974), which were the two rodents whose remains were found in the nest.

The only vertebrate parasite found was an engorged chigger, *Euschoengastia peromysci* (Ewing), which mainly parasitizes white-footed mice (*Peromyscus leucopus* (Raf.)). Perhaps white-footed mice were also among the owl's prey, or the chigger might have been parasitizing one of the rodents whose remains we found. Another possibility is that white-footed mice may previously have used the owl nest site as a nest and denning site of their own.

Most of the other species found were either saprovores or fungivores. *Acotyledon paradoxa* Ouds. is a fungivore known from screech owl and great horned owl (*Bubo virginianus* Gmelin)) nests in New York, mice

nests in Maryland, and from the USSR (Fain and Philips 1978b) so this find represents a new record for the State of Connecticut. *Cosmoglyphus* is another fungivore, while the oribatid mites are species associated with decomposing plant material. Overall, the community appears to be dominated by carrion insects and their associated mites. Scavenging fly larvae serve as food for predators like the histerid and silphid beetles and the mesostigmatic mites, which may also feed on nematodes and other mites. The silphid beetles also feed directly on the carrion, while the trogid beetles eat the hair from the carrion and feathers lost by the owls. No avian parasites were found, but the development of anaerobic conditions in the sample before analysis caused our results to be very incomplete. A thorough study of saw-whet owl nests is needed to accurately determine the composition of the arthropod community, the presence and density of nidicolous saw-whet parasites, and how the arthropod community changes during the nesting period.

Table I. Arthropods from a saw-whet owl (***Aegolius acadius*** (Gmelin)) nest in Connecticut.

CLASS	ORDER	FAMILY	GENUS & SPECIES	NUMBER	STAGE
Insecta					
	Coleoptera				
		Elateridae	Elaterinae sp.	1	larva
		Histeridae	*Carcinops* sp.	1	adult
		Silphiade	*Nicrophorus pustulatus* Hersch.	3	adults
		Trogidae	*Trox aequalis* Say	12	adults
	Diptera				
		Muscidae	*Fannia* sp.	1	larva
		Scatopsidae	sp.	1	larva
Arachnida					
	Acarina				
	Mesostigmata				
		Eviphididae	*Eviphis* sp.	11	adults
		Macrochelidae	*Macrocheles* n. sp.	8	adults
		Parasitidae	*Poecilochirus necrophori* Vitz.	16	adults, nymphs
	Prostigmata				
		Pyemotidae	n.g.	18	adults
		Pygmephoridae	*Bakerdania* sp.	1	adult
		Trombiculidae	*Euschoengastia peromysci* (Ewing)	1	larva
	Astigmata				
		Acaridae	*Acotyledon paradoxa* Ouds	7	hypopi, nymphs
			Cosmoglyphus sp.	1	hypopus
		Anoetidae	*Histiostoma* sp.A.	89	hypopi
			Histiostoma sp.B	8	hypopi
		Glycyphagidae	*Dermacarus newyorkensis* Fain	6	hypopi
			Glycyphagus hypudaei (Koch)	18	hypopi
	Oribatei				
		Galumnidae	*Pergalumna* sp.	1	adult
		Parakalumnidae	*Protokalumma depressa* (Banks)	1	adult

ACKNOWLEDGMENTS

We wish to express our sincere appreciation to Dr. R.A. Norton and Dr. A.E. Newton for reviewing the manuscript and to the following experts for taxonomic assistance: R.A. Norton (Oribatei), A.F. Newton (*Nicrophorus*) and R.M. Emberson (*Macrocheles*).

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